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A.D. 1890

(Under International Convention.)

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being date of first Foreign Application (in } 17th Mar., 1890
United States of America),

Date of Application (in United Kingdom), 16th Oct., 1890

Complete Specification Left, 16th Oct., 1890—Accepted, 17th Jan., 1891

COMPLETE SPECIFICATION.

Improvements in Artificial Hands.

I, SAMUEL LUCAS of Poquetanuck in the County of New London State of Connecticut United States of America, Woollen Manufacturer do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

5 The object of this invention is to provide an artificial hand that may be used to perform certain kinds of manual labour, which shall be strong and serviceable and cheaply constructed.

To more clearly illustrate said invention, two sheets of drawings are annexed hereto, in which

10 Figure 1 is a side view of a hand embodying said invention and

Figure 2 a view of the same from the back or top side.

Figure 3 is a sectional view on line $z-z$ of Figure 2, and

Figure 4 a similar view of those portions adjacent to the hinge joint, but with the spring pawl thrown out of engagement with the ratchet-teeth, as hereinafter
15 described.

Figure 5 is a sectional view on line $x-x$ of Figure 1, and

Figure 6 is a perspective view of the thumb, detached from the hand and inverted to expose the tenon or boss by means of which it is strongly connected with said hand.

20 In Figure 7 is shown the index finger with a fork attached thereto and in

Figure 8 an end view of the clamping ferrule v by means of which said fork, or any similar tool, may be attached to said finger.

Referring to the drawings:—

The letter a denotes the body or main section of the hand, made of wood or other
25 light material. This section a is provided with a shank b that is fitted to enter a socket in a false wrist secured to the stump of the arm, in any of the ways common to this class of devices. It has been a common practice in securing artificial hands to the stump to provide a shank substantially like shank b in outward appearance, but fastened rigidly in the hand section. In the hand here shown, the said shank is
30 pivotally secured in a recess in said hand, by a screw or pin c , as shown in Figures 3 and 5, and is held normally in alignment with the hand by a bow spring d made of flat metal, whose free ends support the shank b on either side. This construction relieves the rigidity which otherwise would result and prevents any sudden and painful shock to the natural stump of the wearer. When lateral pressure is brought to bear
35 on the artificial hand, the spring d may yield as shown in dotted lines in Figure 5, but said spring is of sufficient strength to return the hand to its normal position when such pressure is removed.

Section a is slotted to receive a set of artificial fingers e that are hinged in place by a rod or pintle f extending through the entire series, and each of said fingers is
40 formed at its inner or hinge end with ratchet-teeth g that are preferably concentric with the pintle f . A spring-pawl h is provided to operate with each finger, said pawl being screwed to the back side of section a and preferably formed of a single piece of

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slit sheet metal as shown. When one or all of the fingers are swung on their hinges, as in the act of closing the fingers, the described spring-pawls drop in the rear of the ratchet-teeth and hold said fingers firmly in the position to which they have been adjusted until the pawls are raised, which is accomplished through, and by means of, a flattened bar *i* that lies in a channel in section *a* under the pawls *h* and near the free ends of said pawls. One end of this bar *i* is bent at a right angle to form an operating handle *k* and thus rock the bar *i* into the position shown in Figure 4 when the pawls are all raised and the fingers may be returned to their extended position. A guard plate *m* may be provided to protect the operating handle *k* and also to limit its downward movement, although such a plate is not absolutely necessary.

In connection with each finger a spring *n* is provided for automatically returning the fingers to their extended position when the pawls are raised. These springs as here illustrated consist of rubber bands or strips having one end fastened by a screw *o* to the back of the hand and the other end or loop attached to a wire eye *q* secured to the finger.

When the pawls *h* are disengaged from the ratchet-teeth, these springs *n* immediately contract and draw the fingers back to their extended position. Springs of wire could be substituted for the described rubber bands if desired, but the latter are found cheap and effective and easily replaced when worn out or broken.

The thumb *r* of this artificial hand is hinged to the side of section *a* by a screw *s*, and, while allowed to move freely on the pivot thus provided, is limited in such movement by a projecting portion *s*¹ that may abut a corresponding projection *t* on section *a* as best shown in Figure 1. To ensure great strength to the thumb *r*, a boss or tenon *r*¹ is provided that is concentric with the pivot screw *s* and enters a corresponding mortise in section *a*.

The first and second joints of the several fingers of said artificial hand are intentionally partially closed at all times and are so constructed for the following reason :—

When said fingers are swung around toward the palm of the hand, they then form a hook (see Figure 3) of great strength, by means of which various things may be lifted, as, for example, the bail of a pail or of a coal-hod, whereas, if said first and second joints were in line with the ratchet joints, so perfect a hook could not be formed.

Various tools may be attached to the fingers, one of which, a fork, is illustrated in Figure 7. Said fork is provided with two ferrules through which the finger passes, one of which, *v*, is formed of two overlapping plates of spring metal (shown most clearly in Figure 8) that clasp the finger firmly and prevent the accidental displacement of the fork.

The artificial hand, as a whole, is strong and serviceable, is not expensive to make and enables one crippled by loss of a hand to perform many duties otherwise impossible.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is :—

1. In combination with a palm having hinged thereto a series of fingers with ratchet-teeth, a corresponding series of spring-pawls, as set forth, and a corresponding series of springs connecting the said palm and fingers, substantially as and for the purpose specified.

2. In an artificial hand formed, essentially, of a series of hinged fingers with ratchet-teeth and pawls, as set forth, and in combination therewith, a thumb pivotally attached to said hand and formed with a strengthening boss that is seated in a mortise in said hand, substantially as specified.

3. In an artificial hand, a series of hinged fingers with ratchet-teeth, a corresponding series of pawls engaging said teeth, and means, as set forth, for raising said

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pawls, the said fingers being rigid from the hinge joint outward and partly closed, as and for the purpose specified.

4. In combination with an artificial hand, a shank pivoted therein and arranged to yield laterally under pressure and a spring, substantially as described, for holding said
5 shank normally in alignment with the hand.

5. In an artificial hand, a series of hinged fingers with ratchet-teeth, a corresponding series of pawls engaging said teeth, and a fork or similar tool clamped to one of said fingers by a spring ferrule, as described.

Dated this 15th day of October 1890.

10

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Fig. 1.

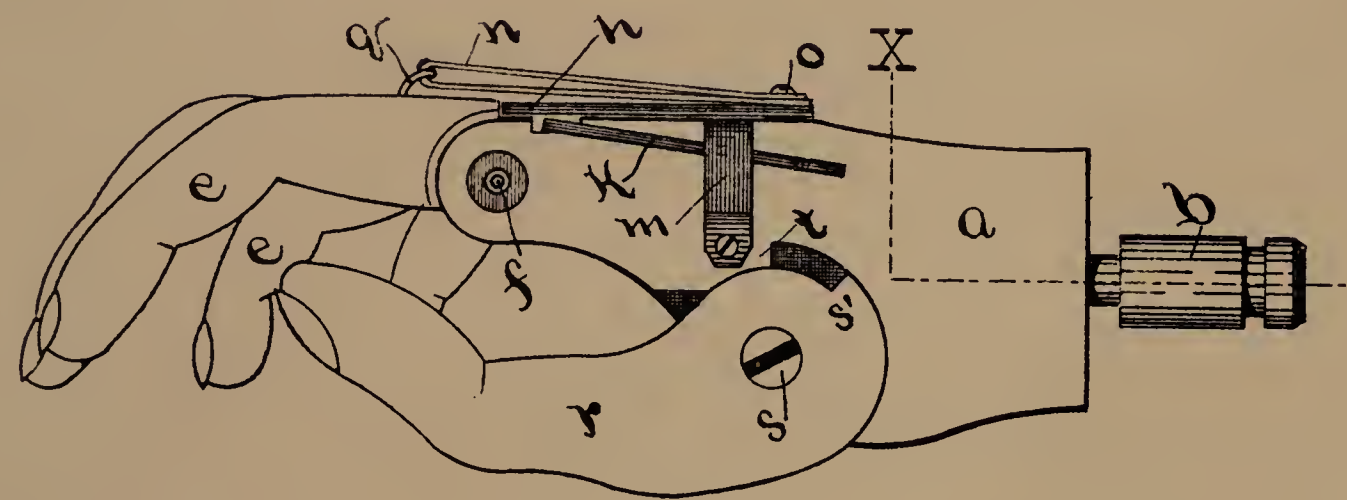


Fig. 2.

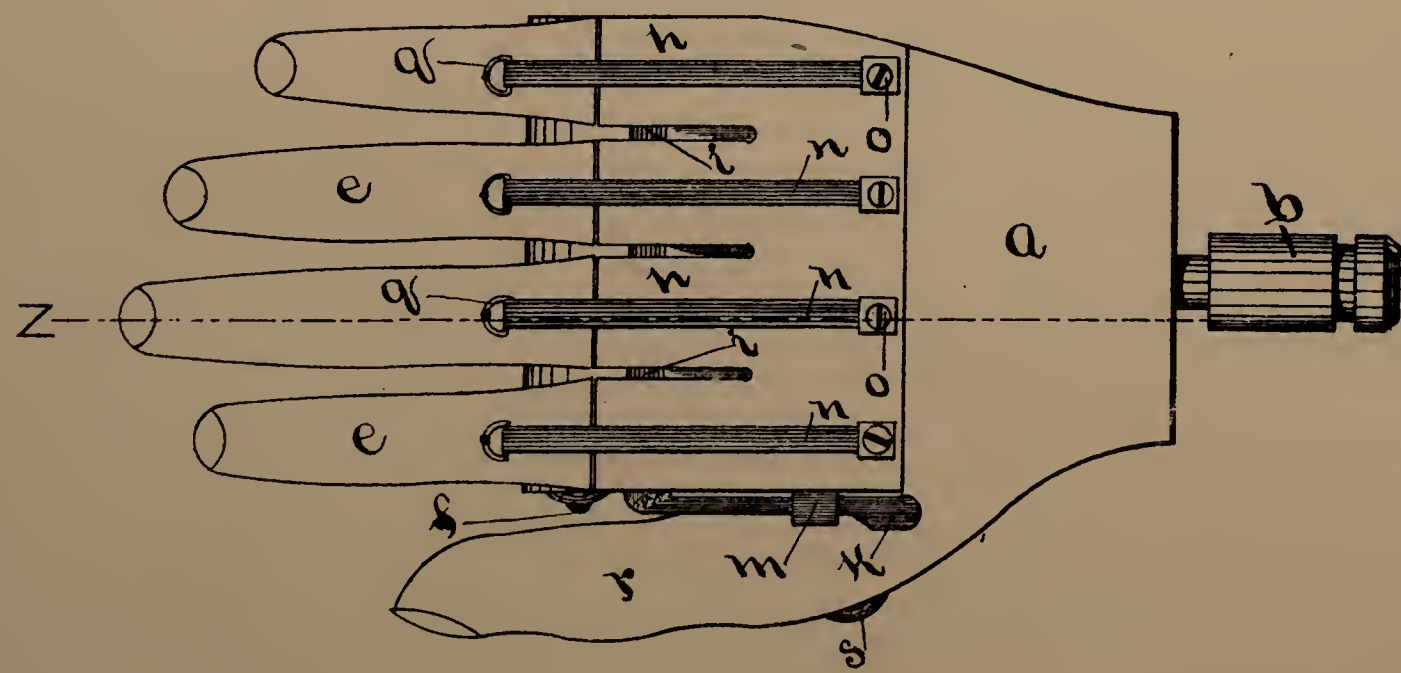


Fig. 4.

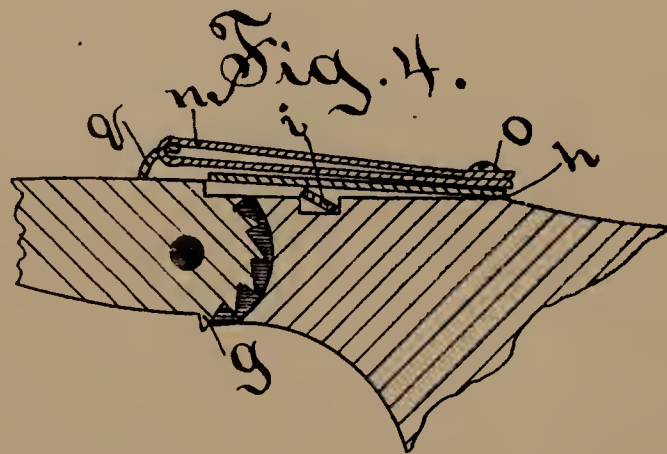


Fig. 3.

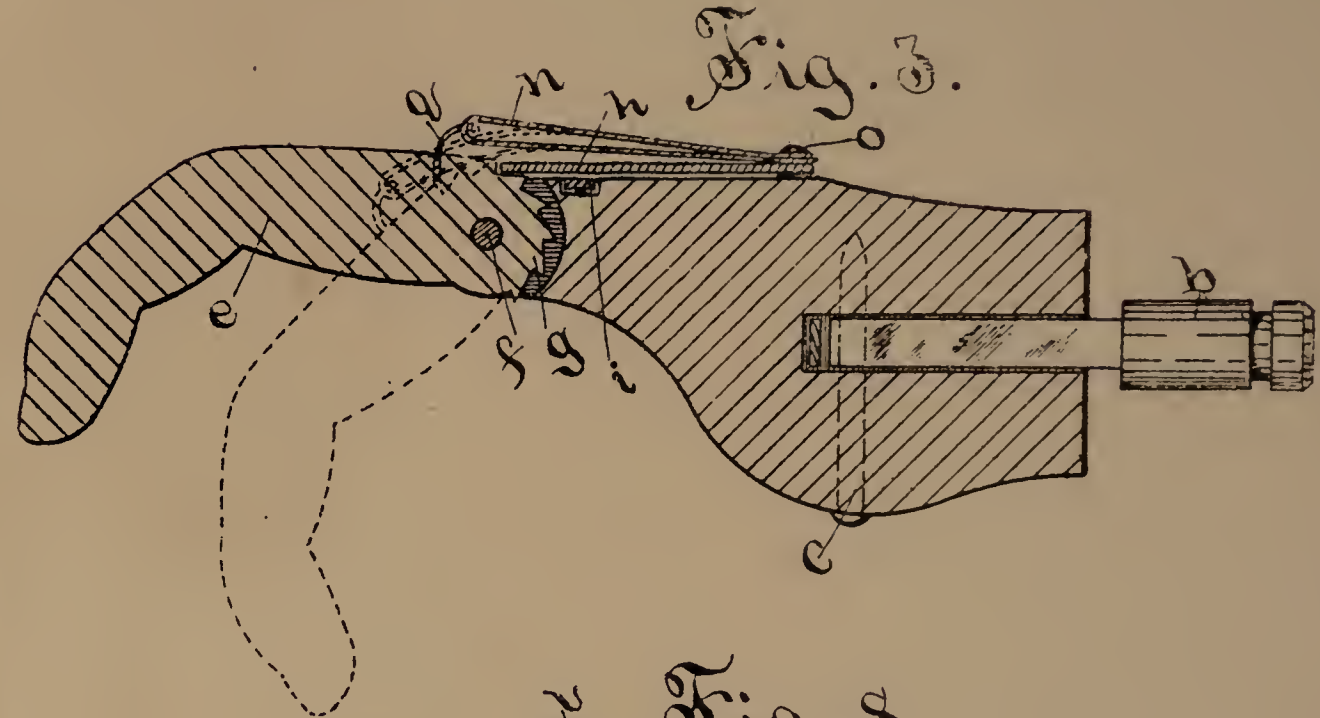


Fig. 8.



Fig. 5.

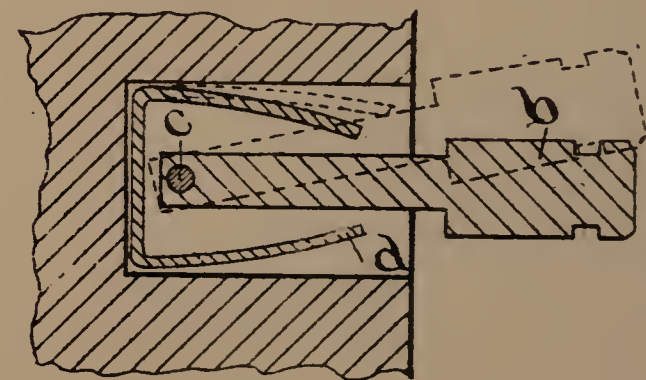


Fig. 6.



Fig. 7.



[This Drawing is a reproduction of the Original on a reduced scale.]

